



Product Summary

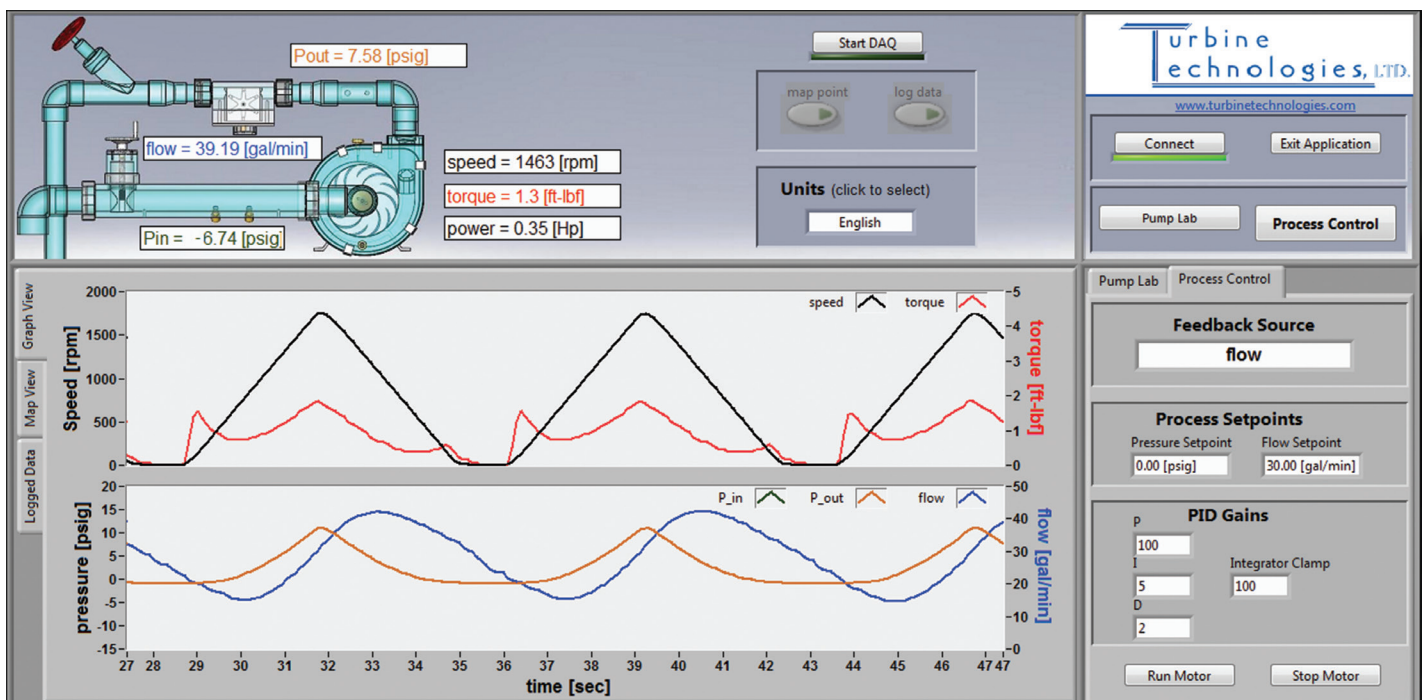
- Integrated Programmable Controller with Pressure and Flow Feedback Loops, PID Gain
- Selectable Operational Modes: Centrifugal Pumping or Process Control
- Fully Instrumented for Flow, Head, Power and Efficiency Analysis
- Integrated Digital Motor Controller Displays Pump RPM, Current and Torque Values
- LabVIEW™ Generated User Configurable Real Time Computer Data Display
- Shipped Ready to Operate

Students will learn: Aspects of incompressible fluid flow, see cavitation, and gain hands-on experience with P.I.D control.

Description

Featuring the industry's only clear view pump housing and fluid circuit; the pump housing, inlet, outlet, diffusion volute, impeller, shaft seals and drive coupling are all visible during system operation. Straight, forward, and backward curved impellers are provided and can be interchanged easily with the provided impeller puller. Pump rotation is controlled through variable frequency drive (VFD). The variable-speed feature allows experimentation into high efficiency electronic fluid flow rate control. Concepts of power management, energy conservation and cost savings in the context of pumps and pumping systems can be examined.

All components are mounted on a portable chassis allowing the entire system to be conveniently moved for use and storage. Visible metal surfaces are stainless steel or anodized aluminum. The steel chassis is powder coated for durability. System piping is high-strength PVC or acrylic. The water supply tank is integral to the unit and completely corrosion proof. Pump impellers and the provided support tools are securely stored and displayed in the integrated front cabinet. A keyed master switch is standard and provides secure control of system usage. A pump prime switch is used to conveniently operate the built in pump priming system.



Data Acquisition System Included

A USB connected digital data acquisition system is fully integrated and pre-calibrated. Sensors measure system parameters and are displayed through LabView™ on the provided computer. It also provides controls for system operation from the computer screen and changing from PumpLab Flow to Process Control Modes. Data can be recorded for playback or analysis. Data acquisition software is user configurable without programming. A comprehensive Operator's Manual details all aspects of system operation.

Details

Dimensions

PumpLab™: 71 x 48 x 29 inches
(180 x 122 x 74 cm)

As Shipped: 81 x 55 x 33 inches
(206 x 140 x 84 cm)

Weight

PumpLab™: 455 lbs (206 kg)

As Shipped: 535 lbs (243 kg)

Operating Conditions / Limitations

Main Pump and Supply Tank:

Maximum Flow Rate: 40 GPM (151 lpm)

Maximum Head: 40 ft (12 mtrs)

Tank Capacity: 20 Gallons (76 ltrs)

Main Pump Motor:

Maximum RPM: 1725

Shaft Power: 3.0 HP (2.2 kW)

Current: 8.2 Amps

Frame Style: JM

Auxiliary Prime / Drain Pump:

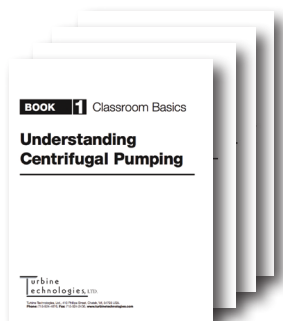
Maximum Flow Rate: 5 GPM (19 lpm)

Operating Requirements

Typical Laboratory or Classroom Setting Power:

208V single-phase 50/60Hz fused at 15 amp

Four Part Curriculum Included



Instrumentation

Digital: High Speed Data Acquisition System

Data Acquisition Software with Configurable Data Output

Windows® Computer

Single Cable USB Connection

Sensors (Preinstalled and Calibrated)

- Pump Inlet Pressure
- Pump Exit Pressure
- Flow Rate
- Pump Torque
- Pump RPM

Provided Operational Accessories

Three Impellers

Straight Impeller ~ $\beta_{IN} 90^\circ - \beta_{OUT} 90^\circ$

Forward-Curved Impeller ~ $\beta_{IN} 90^\circ - \beta_{OUT} 115^\circ$

Backward-Curved Impeller ~ $\beta_{IN} 60^\circ - \beta_{OUT} 20^\circ$
(with splitter vanes)

Impeller Diameter:

Outer 6.500" (16.51 cm)

Inner 2.225" (5.65 cm)

Impeller Blade Height:

Outer 0.135" (0.34 cm)

Inner 0.312" (0.79 cm)

Stroboscope ~ adjustable from 0 to 3000 fps

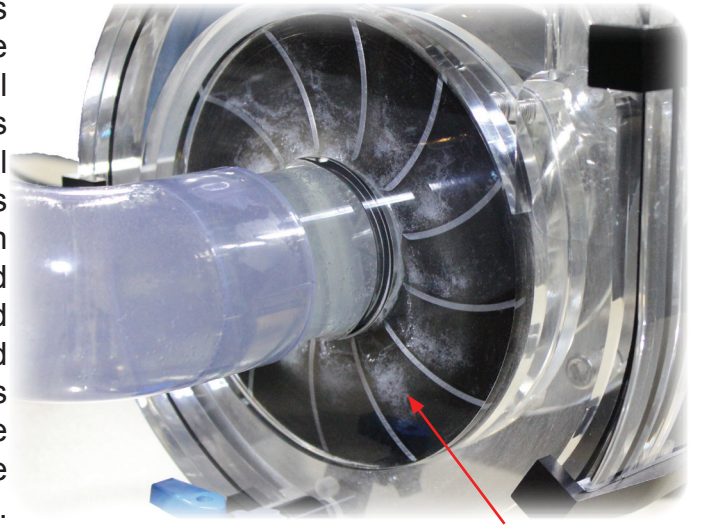
Impeller Change Tool

Prime/ Drain T-Handle

Motor Control Keypad

Experimental Opportunities

Numerous experimental and research opportunities are available and readily conducted with the PumpLab™ Centrifugal Flow/Process Control System. The installed pressure and flow sensors allow basic experimentation relating to typical secondary physics and undergraduate fluid dynamics courses. Immediate access to the three common pump impeller types permits detailed analysis and experimental verification of energy, momentum and fluid machinery type problems. With the advanced variable frequency drive (VFD) system, concepts concerning efficiency and power conservation are easily explored, including process control via pressure or flow feedback loops and PID gain application. Visual vaporization bubbles help in the understanding and correlation of cavitation phenomena. Standard courses in engineering thermodynamics and fluid mechanics benefit from textbook direct examples conducted and measured in real time. Available class work and lab work curriculum enhance these capabilities. The limitations of theoretical models and the variability of experimental technique can be experienced first-hand. In addition to academics, the PumpLab™ is ideally suited for general pump and flow system familiarization as well as advanced practical studies for the technical and vocational student.



Impeller with Visible Cavitation

Purchase Specifications

- LabVIEW™ process control virtual instrument panel with real time sensor performance monitoring.
- ABB/Baldor™ Industrial programmable Variable Frequency Drive (VFD).
- Built-in process control programmable software.
- Integrated data acquisition system.
- Integrated Process Control Logic circuit.
- Built-in pressure and flow feedback circuits.
- System fully assembled, tested and ready to operate.
- Detailed sample lab procedure included.



PumpLab™ has a free two year warranty on the entire system

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All PumpLab™ specifications are subject to change